

REMARKS

Upon entry of this amendment, claims 1, 2, 4-9, and 11-21 will remain in this application. Claims 3 and 10 were previously canceled. Entry of the amendment and reconsideration of the application are requested.

The claim amendments appearing above are made after consideration of the comments provided by the Examiner in section 4 on page 2 of the Office Action. It is respectfully submitted that all of the claims in this application now fully comply with the requirements of 35 U.S.C. §112, second paragraph.

Reconsideration of the rejections of independent claims 1, 9, and 14-21 is requested. Each of claims 1, 9, and 14-16 defines a rolling method comprising, in addition to others, the particular step or operation of fixing axial positions of work rolls so that axial positions of the work rolls are not moved while a strip of material is being rolled. Each of claims 17-20, similarly, defines a strip rolling facility comprising, in addition to other elements, a mechanism for performing, in addition to others, a "fixing" step or operation identical to that recited in claims 1, 9, and 14-16. Claim 21 defines a reversible rolling facility having the same "fixing" step or operation. As noted by the Examiner in section 6 on pages 2-3 of the Office Action, U.S. Patent 5,622,073 to Hiruta et al. does not disclose a fixing step or operation as recited. Newly cited and applied U.S. Patent 3,857,268 to Kajiwaka also lacks this feature.

According to the Kajiwaka description, as the plate width of the rolled material changes successively, the working roll is axially shifted accordingly. The Kajiwaka patent disclosure, however, is silent about whether the axial positions of the working rolls are fixed or the working rolls are axially shifted when a strip of the same width is being rolled. It would be ordinary for one skilled in the art to think that cyclic shifting is conducted in the Kajiwaka rolling mill. During cyclic shifting, work rolls are cyclically shifted within a desired range to disperse wear of the rolls caused by the ends of a rolled strip. Such cyclic shifting is present during operation of the Kajiwaka rolling mill for reasons outlined below.

Generally, in rolling, a rolled strip is not allowed to come out of the axial ends of work rolls. This is because portions not rolled in the ends of a rolled strip, if any, greatly deteriorate the strip shape and may cause strip breaking or biting. One may consider disposing strip ends substantially in alignment with either ends of work rolls or the start points of the stepped portions of the work rolls, in the case of Figure 9 of Kajiwaka, or disposing the strip ends slightly inside of the work roll ends. However, it is difficult in practice to continue rolling in the positional relation of the strip ends and the working roll ends ( $\delta = 0$ ) shown in Figure 3 of the Kajiwaka patent.

On the other hand, it is also not preferable to dispose the strip ends too far inside of the work roll ends. This is because

when the strip ends are so disposed ( $\delta > 0$ ), the work roll ends do not wear uniformly, and it becomes impossible to keep surfaces of the work roll ends straight.

When considering the technical issues mentioned above, one of ordinary skill in the art would note that, in Figures 1 and 3 of the Kajiwaka patent, the strip ends are in alignment with the working roll ends whereas, in Figure 2, the strip ends are disposed slightly inside of the working roll ends. Thus, one of ordinary skill in the art would understand, from this disclosure, that only the state of  $\delta = 0$  is not good and only the state of  $\delta > 0$  is also not good for setting axial positions of the work rolls when rolling a strip of the same width. Such a person would not fix axial positions of the working rolls and cyclically change them between  $\delta$  and  $\delta + \alpha$ .

The Kajiwaka patent also discloses that the work rolls of the rolling mill have stepped portions rather than tapered portions situated inside of the width of a strip. This situation is different from that of the present invention and does not lead to the claimed invention. It is impossible, for example, for the embodiment shown in Figure 3 of the Kajiwaka patent to roll a strip while sifting the ends of working roll bodies within the strip width because such rolling will cause the strip to break. Consequently, one of ordinary skill in the art would not think of applying tapered portions to the work roll and, further, deriving an appropriate positional relation between the widthwise

ends of a strip and the start points of the tapered portions from the Kajiwaka patent disclosure.

The Kajiwaka patent disclosure further discusses wear of the working rolls as a surface defect in the working rolls, and particularly focuses on wear which is large in the center of the width of a strip. There is nothing indicating that marks caused in rolls by the strip ends are considered. The present invention, by contrast, aims to eliminate such marks. Further, in view of stepped wear on one side of the working roll, Kajiwaka positively arranges the roll end of that roll outside of the strip width. There is no consideration given to a situation, such as that addressed by the present invention, in which strip edge marks are inevitably formed in the work rolls. The Kajiwaka patent neither discloses that such an issue arises in rolling of a strip of the same width nor suggests a solution addressing such an issue.

The Kajiwaka patent discloses a rolling mill in which the working rolls have stepped portions. In contrast, the present invention relates to a rolling method or facility using work rolls with tapered portions; this is different from both the Kajiwaka disclosure and the disclosure of the primary Hiruta et al. reference. The Hiruta et al. and Kajiwaka mills are clearly different from each other, and there is no justification for combining them as Examiner proposes. Even assuming that teachings provided by the Hiruta et al. and Kajiwaka patents can be combined as proposed by the Examiner, since both of these documents fail to teach the claimed fixing step or operation

discussed above, the invention, as presently defined by claims 1, 9, and 14-20, is patentable.

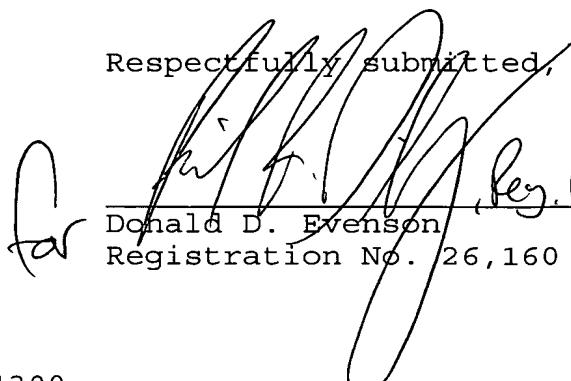
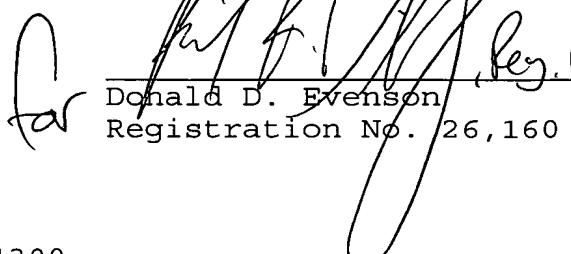
U.S. Patent 6,286,354 to Kajiwara et al., relied on as an additional secondary reference to reject claim 21, also fails to suggest the fixing step or operation mentioned, and the invention as presently defied by claim 21 is patentable.

Each of claims 1, 9, and 14-21 is patentable for reasons discussed above. Dependent claims 2, 4-8, and 11-13 are patentable as well. All claims remaining in this application, therefore, are now patentable.

This application will be allowable after entry of this amendment for reasons discussed above. Entry of the amendment and reconsideration of the application are again respectfully requested. Should the Examiner have any questions after considering this amendment, the Examiner is invited to telephone the undersigned attorney.

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